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STATUS AND TASKS OF SCIENTIFIC RESEARCH ON THE PROPHYLAXIS OF INFECTIOUS DISEASES -- Moscow, Vestnik Akademii Meditsinskikh Nauk SSSR, No 2, Jun 1954, pp 31-34

All prerequisites for the elimination of infectious diseases by prophylactic methods exist in the USSR. Smallpox, plague, cholera, and relapsing fever have already been eradicated; considerable success has been achieved in the prophylaxis of malaria, typhoid, dysentery, and typhus. In the field of the prophylaxis of infectious diseases, Soviet medicine occupies the foremost place in world science. On the basis of the materialistic theory of the epidemic process, which regards the origin and course of epidemics not as a purely biological phenomenon but as a process which is primarily determined by social and economic factors, and also on the basis of Michurinist biology and Pavlovian physiology, USSR scientists have developed a general system for the prohylaxis of infectious diseases and systematic procedures for the prophylaxis of individual infectious diseases such as plague, cholera, smallpox, typhus, brucellosis, malaria, and others.

Important investigations have been carried out in the field of natural reservoirs of infections. The theory of natural reservoirs was first advanced by Soviet scientists and was substantially developed by them. This fact made it possible to carry out effective measures for the prevention of infections which are adapted to the specific characteristics of the epidemiology of these infections.

In connection with the problems of the prophylaxis of infectious diseases and elimination of some of them, research on the modification of microorganisms is of exceptional importance. Work on this problem is of the greatest importance from the standpoint of general biology, and is also of theoretical significance in connection with the development of measures for the control and prevention of infectious diseases.

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On the basis of research on the relationships pertaining to the modification of microorganisms USSR investigators have solved the very important problems of obtaining vaccine strains for the prophylaxis of smallpox, plague, tularemia, brucellosis, influenza, and other diseases. On the basis of the regularities underlying the propagation and multiplication of microorganisms, new methods for their cultivation have been developed. These methods have made it possible to change radically the procedure for the production of bacterial preparations and to improve their quality considerably. Among measures applied in the USSR for the prophylaxis of infectious epidemic diseases, an important place is occupied by specific immunoprophylaxis and immunotherapy. The basic principles of these measures are derived from the results of the investigation of laws of the pathogenesis of infections and of immunity.

At present, the role which the summation of specific irritations and of reflectory effects play in the pathogenesis of bacterial infections and in immunogenesis has been demonstrated with certainty. It has also been proven that the processes involved in these phenomena are regulated by the higher divisions of the central nervous system, and that the different mechanisms are mutually interconnected in such a manner that their activity is regulated both directly by the nervous system and indirectly by effects transmitted over the humoral path. In other words, it has been shown that the development of diseases and the formation of immunity are subject to the physiological laws established by I. P. Pavlov. A considerable amount of research is conducted in the USSR on the problem of the specific immunoprophylaxis and immunotherapy of infectious diseases. As a result of these investigations new methods of immunization have been developed, and new bacterial preparations have been obtained for prophylaxis and therapy.

Thus, during recent years, live vaccines against tularemia, brucellosis, and influenza have been obtained. Methods for the preparation of dry vaccines and for the production of highly purified and concentrated sera for the therapy of diphtheria and of anaerobic infections have been developed.

As far as work on individual infections is concerned, a special place is occupied by investigations on virus infections and rickettsioses. During the shortest possible time our researchers have investigated the etiology and epidemiology of seasonal encephalites, hemorrhagic fevers, and a number of rickettsioses. On the basis of the data obtained a system of measures for the prophylaxis of these diseases has been developed.

Although signal successes have been achieved in research on the prophylaxis of infectious diseases, shortcomings are present in the work done in this field. For instance, general theoretical problems in the fields of epidemology, microbiology, and immunology are not being subjected to adequate study. Problems such as that of the effect of environmental factors on the course of epidemic processes have not yet received adequate treatment in research work. Furthermore, a problem like that of the formulation of general principles to be applied in the elimination of infectious diseases has not yet been solved, notwithstanding the fact that this problem was originally defined at the Academy of Medical Sciences USSR.

Investigations dealing with the analysis and generalization of the results of experience acquired in practical antiepidemic work are being conducted on an insufficient scale. Investigations on the problems of the modification of microorganisms are being conducted primarily under experimental laboratory conditions. However, insufficient attention is being paid to the role which processes of modification play under natural conditions and during the course of the process of infection. In the study of the directed modification of microorganisms, biochemical and morphological methods of research are being applied inadequately. Such methods would make it possible to acquire a deeper knowledge of the metabolism of microorganisms and disclose the nature of the phenomena which take place in connection with metabolic changes.

Some infections which occur widely and inflict the greatest harm to the health of the population are not being investigated sufficiently. Thus, investigations on whooping cough, scarlet fever, and measles are inadequate in extent, and therefore the problems of the specific prophylaxis and therapy of these diseases have not yet found an adequate solution. Investigations on the prophylaxis and therapy of influenza are insufficient in scope. The problems of physiology of viruses are not being studied adequately. The same applies to the general and specific laws underlying the epidemiology of virus diseases. Some problems which are of great theoretical and practical importance, for instance those dealing with the significance of reflectory and conditional reflex mechanisms in the pathogenesis of infections and in immunogenesis, are being studied in a laggardly manner.

There are significant drawbacks in the organization of research work. For instance, the problem of the coordination of research in the field of immunity has not received a practically feasible solution. As a result there is unnecessary duplication of work.

The Presidium of the Academy of Medical Sciences USSR does not always correctly define the most important fields of research and the basic problems on which research is to be conducted. For that reason, work on many problems, as for instance the theoretical problems of epidemology, the problem of the prophylaxis of children's infections, and problems pertaining to the investigation of rickettsioses, has not received sufficient support from the Presidium of the Academy of Medical Sciences USSR. As a result the solution of these problems has not advanced to an adequate extent.

Starting from an analysis of the status of scientific research in the field of the prophylaxis of infectious diseases and taking into consideration the level of the incidence of infectious diseases in our country, we may regard as basic and requiring solution in the near future, the problems outlined below:

1. In the field of epidemiology it is necessary to expand research on theoretical problems, particularly the problem of the effect of environmental factors on the course and development of the epidemic process. This research should be done with the aim of developing, on the basis of the data obtained, and on the basis of a generalization of the results of the practical experience acquired in sanitary-antiepidemic work, a general theory for the elimination of epidemic diseases under the conditions whichexist in the USSR. Problems of regional epidemiology which are connected with specific peculiarities pertaining to the development of the epidemic process depending on local climatic, domestic, geographic, and other conditions are also of the utmost importance.

2. In the field of microbiology one must deepen and expand research dealing with the directed modification of microorganisms, and the elucidation of the metabolic processes of microorganisms taking place under natural conditions and during the course of an epidemic infection. The work on the modification of microorganisms must be conducted in collaboration with biochemists and pathomorphologists.

3. In the field of immunology it is necessary to expand research on the role which Pavlov's physiological theory plays in the processes of the pathogenesis of infections and immunity. This should be done in order to create a national theory pertaining to the fundamental aspects of the pathogenesis of infections and immunity.

4. As far as the clinical aspects of infectious diseases are concerned, the most important problems are investigation of the pathogenesis of the most common diseases and development of methods of therapy which would eradicate the causative factor of the disease. In connection with this the necessity arises of finding new antibiotics and of studying thoroughly the mechanism of their activity.

5. In the subdivision of special infections, particular attention should be paid to problems pertaining to influenza, dysentery, rickettsioses, and children's infections (scarlet fever, measles, and whooping cough). In connection with this one should concentrate on finding means for the general and specific prophylaxis and therapy in these infections.

The problem of the prophylaxis of infectious diseases and of the elimination of some of them will be successfully solved under the condition that the achievements of science will find their full reflection in practical work and will be combined with appropriate organizational measures. One must improve the work of sanitary-epidemiological stations and provide them with highly qualified personnel consisting of epidemiologists, microbiologists, and infectionists. The same applies to scientific research institutions. -- V. D. Timakov, Active Member, Academy of Medical Sciences USSR

SHORTCOMINGS IN WORK ON INFECTIOUS DISEASES -- Moscow, Vestnik Akademii Meditsinskikh Nauk SSSR, No 1, Mar 1954, p 47

Many problems pertaining to the theory and practice of work on the prevention and control of infectious diseases have not been solved, or are being solved very slowly. One of the problems which has not been solved is that of the prophylaxis of dysentery. The measures carried out by public health organs with respect to this disease have not yet achieved their purpose. We cannot be satisfied merely with an improvement in diagnostic methods and a reduction of lethality. In addition to shortcomings in the work of public health organs, one of the principal causes of the lack of success in the control of this disease is the absence of therapeutic methods, the application of which would result in eradication of the causative factor of the disease. No one is doing work on the development of live antidysentery vaccines. Insufficient attention is being paid to the dispensary method of the prophylaxis of dysentery, although practical workers are strongly in favor of it. Effective vaccines against scarlet fever, whooping cough, or measles have not been developed. An outstanding task of the Academy of Medical Sciences will consist in engaging the efforts of specialists for the solution of these problems.

The epidemology of the few cases of typhus that still occur shows the existence of new regularities, which must be explained. The efforts of our leading epidemologists must be concentrated on the clarification of these peculiarities of typhus, so that efficient measures may be taken for the elimination of the few remaining foci of this disease.

Our scientific work in epidemiology and microbiology does not keep step with the requirements put to it by life and by practical medicine. One of the reasons for this tendency to lag is the stagnation which exists in work on the development of a theory of general epidemology. The shortcomings which have been pointed out are caused partly by the fact that the Presidium of the Academy of Medical Sciences USSR underestimates this most important subdivision of prophylactic medicine and partly by weaknesses in the work done by the Bureau of the Department of Hygiene, Microbiology, and Epidemiology.

The Presidium of the Academy of Medical Sciences USSR has done nothing with respect to the development and introduction into practical use of the new technology for the production of bacterial preparations.

Another error committed by the presidium consists in its wrong attitude towards problems connected with the inculcation of I. P. Pavlov's physiological teaching. Our leading physiologists do not follow Pavlov's precepts, i.e., they do not give help to practical workers. Participants at a conference dealing with the physical training of children, efficient methods of instruction, and

the creative application of Pavlov's teaching in the field of school hygiene wanted to listen to talks given by our leading physiologists and to seek their advice. Although A. G. Ivanov-Smolenskiy and M. A. Usiyevich received three invitations to participate in the conference, they did not attend the conference. Nevertheless, school hygiene requires the help of physiologists more than other discipline, because one literally cannot make the slightest move in school hygiene without physiology.

The presidium does not pay any attention to decisions made by the bureaus of departments. As a result the authority of these bureaus has been undermined; they have been transformed into advisory organs whose decisions nobody takes seriously. One must raise the responsibility of the bureaus and transform them into operating and executive agencies, so that the presidium will be relieved of excessive work.

The question of calling an all-union conference of hygienists, microbiologists, and epidemiologists has become timely. -- V. M. Zhdanov, Corresponding Member of Academy of Medical Sciences USSR

COMMENTS ON A REPORT BY V. D. TIMAKOV -- Moscow, Vestnik Akademii Meditsinskikh Nauk SSSR, No 2, Jun 1954, p 37

I shall comment on some points of V. D. Timakov's report which in my opinion are subject to argument from the theoretical or practical standpoint.

First of all, one cannot completely agree with Timakov's view that the regulation of the process of formation of antibodies by conditioned reflexes is impossible. Even if we admit that the normal production of antibodies under natural conditions takes place without the influence of temporal associations with the cerebral cortex, one must point out that at the Institute of Epidemiology and Microbiology at Leningrad it was possible to show that the formation of such temporal associations may occur and that the production of various types of antibodies takes place as a result of the action of indifferent conditioned irritants.

One must also note that the initial strains for the creation of effective attenuated live vaccines for active immunization must be natural strains of the pathogenic causative factors of diseases. It is very unlikely that vaccine strains can be created from saprophytic varieties of microorganisms.

One can not agree with Timakov's statement to the effect that the public health service does not at present have at its disposal specific methods for the prophylaxis of influenza. A vaccine has been developed in the USSR which, on the basis of tests carried out on a large scale, lowers the incidence of influenza by at least a factor of two. The methods involved in the production and application of this vaccine must be perfected, and the Academy of Medical Sciences USSR must render aid to efforts aimed in that direction.

The specific serum prophylaxis [of influenza] proved to be still more effective than active immunization. The inhalation of serum in the form of a dry powder lowers the incidence of influenza by no less than a factor of four, and shortens the duration of the disease by at least 50% while completely preventing complications.

If the anti-influenza serum is administered in the state of a dry powder and does not penetrate into the lower regions of the intestinal tract, it does not exhibit at all the objectionable property of the liquid preparation, i. e., it does not produce any sensitization of the organism to equine protein. -- A. A. Smorodintsev, Corresponding Member, Academy of Medical Sciences USSR

STATUS OF WORK PERTAINING TO PROPHYLAXIS OF INFECTIOUS DISEASES -- Moscow, Vestnik Akademii Meditsinskikh Nauk SSSR, No 2, Jun 1954, pp 37-38

The status of our scientific research makes it possible to pass from problems of the reduction of the incidence of infectious diseases to the complete elimination of some of them, as in the case of malaria, during the next 5-year Plan; of pappataci fever, of leishmaniasis, occurring in cities; and of some other diseases.

The status of this problem depends to a considerable extent on the state of our knowledge pertaining to the spread of infectious diseases and their pathogenesis. On the basis of such knowledge one may develop efficient methods of prophylaxis. Different diseases require different methods for their prophylaxis. For instance, one may control by the method of prophylactic immunization only diseases which produce stable immunity. For that reason one can not agree with Timakov's assumption that we shall achieve decisive success in the prophylaxis of dysentery if we adopt immunization with live vaccines. The situation is different with respect to infectious diseases which create a stable immunity, as, for instance, the infections transmitted by droplets (whooping cough, scarlet fever, and measles). In the prophylaxis of measles, the most important problem will be the creation of an effective method of immunization against this disease. The work done by E. I. Ioffe, at our laboratory, makes it possible to approach the problem of carrying out extensive tests of the vaccines developed for the prophylaxis of measles. The difficulty consists in the fact that the virus of measles is very unstable, so that on being exposed to different conditions of existence it rapidly loses its original properties. The aid of the Presidium of the Academy of Medical Sciences USSR is required to make it possible to carry out experiments on monkeys or apes, so that children can be inoculated later. -- P. G. Sergiyev, Corresponding Member, Academy of Medical Sciences USSR

REMARKS ON IMMUNOGENESIS AND FILTERABLE FORMS OF BACTERIA -- Moscow, Vestnik Akademii Meditsinskikh Nauk SSSR, No 2, Jun 1954, p 44

Research on the regulation of immunological processes by the nervous system suffers from two defects:

1. Many scientists limit themselves to a consideration of the problems of immunogenesis or, to be more exact, the problem of the formation of antibodies, and concentrate their attention on the question as to whether the formation of antibodies can be induced by conditioned reflexes. One must differentiate between two aspects of the process, the neuroreflectory stimulation of the work of the immunogenesis apparatus and the immunological specificity of the products of the activity of their apparatus, i. e., the antibodies. This specificity depends on the antigenic specificity of the unconditional irritant. If the problem is considered from this standpoint, no confusion can arise.

2. The investigations are being carried out in a primitive manner. In many cases, some disturbance in the normal nervous regulation is produced and the end effect is noted by establishing whether or not there is an aggravation of the process of infection and an increased production of antibodies. One must try to elucidate the nature of the effects produced by changes in the nerve regulation, and determine how these changes are reflected in individual immunological phases which determine the course of the process of infection.

In regard to the modification of microorganisms and filterable forms of bacteria, one may say, as far as scarlet fever is concerned, that filterable forms are of no actual significance either in the pathology or the epidemiology of the process of infection.

As far as scarlet fever is concerned, work was done only on the characterization of the types of streptococci. During 2 years investigations were conducted at the Leningrad Institute of Epidemiology on the "causative factors of scarlet fever" with the view of proving that "the virus of scarlet fever" is extraneous, i.e., the virus has no connection with the disease. Large funds were expended on these investigations.

The otherwise valuable method of treating scarlet fever with penicillin has an influence on the development of immunity. The percentage of recurrences of scarlet fever among children who had been treated with penicillin was found to be higher than among children who had not been treated with this antibiotic. This is worth noting.

Research on the toxicity of streptococci is of importance not only from the standpoint of the epidemiology of scarlet fever, but also from that of the problems of anginas and rheumatic fever. Work on the development of a preparation of the anatoxin type has not yet led to a positive result. If it will not be possible to develop an anatoxin, one must take into consideration the use of a toxin which exhibits an adequate toxicity when appropriate methods of application are used.

In connection with the problem of rheumatic fever, one must consider not so much acute anginas as chronic tonsillitis and other chronic and recurrent infections. Our investigations on the etiology of rheumatic fever have shown that the participation of a virus as a causative factor is not to be assumed in this disease.

At present, a method for the early diagnosis of whooping cough has been developed, and work is being done on the specific prophylaxis of this disease. Combined inoculations against whooping cough and diphtheria are being studied.

It is desirable that the Academy of Medical Sciences USSR initiate an annual publication in which every member of the academy will be able to review the results of his research. -- V. I. Ioffee, Corresponding Member, Academy of Medical Sciences USSR

RECENT PROGRESS IN WORK ON VIRUSES AND VIRUS DISEASES -- Moscow, Vestnik Akademii Meditsinskikh Nauk SSSR, No 2, Jun 1954, p 39

For the first time, the possibility of suppressing the propagation of viruses by means of chemical compounds has been shown. Recently, at the Institute of Virology, it has also been demonstrated that one can stimulate the propagation of viruses. The line of research referred to here leads to a solution of the problem of the cultivation of viruses outside of living bodies and gives scientific basis to the search for chemotherapeutic agents which will be active against viruses.

It has been shown that the synthesis of viruses is subject to the general laws pertaining to the synthesis of living matter, and that adenosinetriphosphoric acid is the source of energy in the synthesis of viruses just as it is in the synthesis of other living matter. In the process of propagation, viruses take up an insignificant amount of matter from the organism, so that the propagation of viruses in the organism is not in itself a cause of the disease. The pathogenicity of viruses consists in interference with many types of metabolism, and the toxic action which is exerted by them on the functions of internal organs and of the central nervous system.

On various models, the influence on the origination of a virus infection of the physiological state of the organism, of the reactivity depending on age, and of nonspecific irritants was shown.

A method for the cutaneous application of vaccines against pappataci fever has been proposed; new vaccines containing stimulants which increase the activity of the vaccine have been developed; administration of the vaccine through the respiratory tract is used in work on the development of a method for immunization against measles; and a peroral method of immunization against poliomyelitis is being developed.

As far as encephalitis is concerned, considerable success has been achieved in the development of new preparations and vaccines which have a high immunogenic activity and induce weak reactions. New methods for the diagnosis of encephalitis have also been developed. -- Prof Ye. N. Levkovich

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